



## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT  
(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference 0441		<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/N 03/00416		International filing date (day/month/year) 30.12.2003	Priority date (day/month/year) 30.12.2003
International Patent Classification (IPC) or both national classification and IPC INV. C11C3/00			
Applicant COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>			
Date of submission of the demand  28.07.2005		Date of completion of this report  07.04.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer  Rooney, K  Telephone No. +31 70 340-3931 	

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IN 03/00416

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):*

**Description, Pages**

1-7 as originally filed

**Claims, Numbers**

1-11 received on 30.01.2006 with letter of 30.01.2006

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

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**INTERNATIONAL PRELIMINARY  
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International application No. PCT/N 03/00416

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-11
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-11
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

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International application No. PCT/IN2003/000416

**Re Item V****Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: WO 03/066567 A (NEO ENERGY KOREA CO LTD ; YOO JEONG-WOO (KR))  
14 August 2003 (2003-08-14)
- D2: PATENT ABSTRACTS OF JAPAN vol. 1996, no. 03, 29 March 1996 (1996-03-29) -& JP 07 310090 A (TENSEI SEIYU KK), 28 November 1995 (1995-11-28)
- D3: CHAI HON YEAN ET AL.: "Studies on the transesterification of glycerides: I: The methanolysis of tripalmitin catalysed by diorganotin (IV) compounds" APPLIED ORGANOMETALLIC CHEMISTRY, vol. 14, no. 6, 2000, pages 304-315, XP008032116 GBHARLOW
- D4: G. ANTOLIN ET AL.: "Optimisation of biodiesel production by sunflower oil transesterification" BIORESOURCE TECHNOLOGY., vol. 83, no. 2, 2002, - 2002 pages 111-114, XP002286047 GBELSEVIER.
- D5: US-A-5 525 126 (BASU HEMENDRA N ET AL) 11 June 1996 (1996-06-11)

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-11 does not involve an inventive step in the sense of Article 33(3) PCT.

The document D1 discloses a process for producing fatty acid alkyl esters suitable for use as a biodiesel. The process steps consist of reacting glycerides with lower alcohols at a ratio of 1:6-60 in the presence of an (0.1-10%) organometallic tin catalyst at 1-10 bar and 60-150°C. The so-obtained glyceride is washed and separated in a separating tower (see D1: as cited in the search report). It would appear that with the exception of the decantation step which is a known alternative, all of the process parameters of claim 1 are disclosed in the document D1. Therefore, it would seem that the process of claim 1 is merely a variation on similar processes and a selection of parameters which are known in the art. Moreover, the claims currently on file do not attempt to distinguish themselves from the molar ratios and catalysts disclosed in the prior art. For these reasons, inventivity can not be acknowledged.

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IN2003/000416

In addition, claims 2-11 do not appear to contain any subject-matter which might contribute to an allowable claim as they relate to features which have already been used for similar purposes in similar processes as is evidenced by the teaching of the documents D2-D5, taken in their entirety.

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AP20R0316701FTO 29 JUN 2006**We claim**

1. An improved process for the preparation of fatty acid alkyl esters suitable for use as biodiesel, said process comprises the steps of,
- reacting fatty acid glycerides with an alcohol having 1-4 carbon atoms in the molar ratio of 3:1 to 30:1 of fatty acids and triglycerides respectively, at a temperature ranging between 70-300°C, pressure in the range of 1-30 bar, in presence of a organometallic catalytic compound of Tin with concentration of catalyst is in the range of 0.01 to 3 weight percent of the fatty acid glycerides;
  - obtaining ester with glycerol;
  - separating the glycerine from the fatty acid alkyl ester as immiscible phase by decantation;
  - purifying the fatty acid alkyl esters by washing with water, and
  - washed ester is treated with an basic adsorbent to obtain biodiesel.
2. A process as claimed in claim 1, wherein fatty acid glycerides are selected from the group consisting of vegetable oil, animal oil, fatty acids and mixture thereof.
3. A process as claimed in claim 1, wherein the adsorbent is selected from the group consisting of bauxite, alumina, silica-alumina and distillation or combinations thereof.
4. A process as claimed in claim 1, wherein the catalyst is selected from the group comprising of dibutyl tin oxide and dicotyl tin oxide.
5. A process as claimed in claim 4, wherein the use of catalyst is for the preparation of fatty acid alkyl esters which is suitable for use as biodiesel.
6. A process as claimed in claim 1, wherein the preferred temperature of the reaction is in the range of 150-200 °C
7. A process as claim 1, wherein the treatment with adsorbent is carried out at 20-60°C.

AMENDED CLAIMS ART.34

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8. A process as claimed in claims 1, wherein the excess alcohol is recovered and recycled.
9. A process as claimed in claim 1, wherein the biodiesel obtained has an acid value in the range of 0.01-0.50 mg KOH/g.
10. A process as claimed in claims 1, wherein the biodiesel obtained has viscosity in the range of 4-7 cSt at 40 °C.
11. A process as claimed in claims 1, wherein the fatty acid alkyl esters produced are suitable for use as fuel in diesel engines, blending component for petrodiesel and as additive in petrofuel for enhancing lubricity, cetane number and biodegradability.

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AMMENDED CLAIMS ART.34